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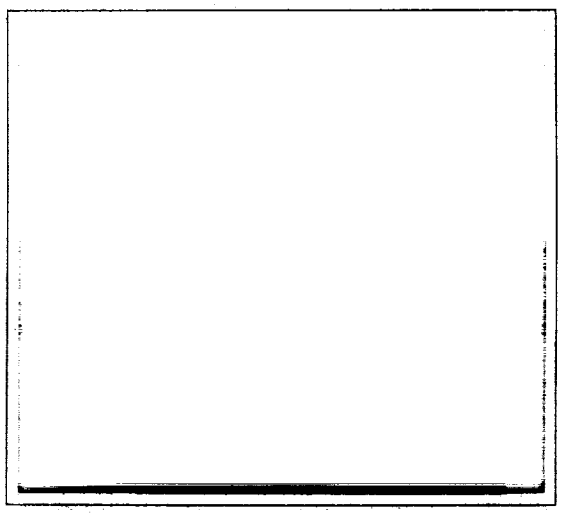

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A Report to:

THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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Code 285
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LETTER CONTRACT NAS5-32632
Contract Data Requirements List Item 16

Submitted by:

Consortium for International Earth Science Information Network
2250 Pierce Road
University Center, Michigan 48710 USA
Phone: (517) 797-2700
Fax: (517) 797-2622

Principal Investigator:
Dr. Robert S. Chen
Program Manager

CIESIN

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Consortium for International Earth Science Information Network
Saginaw, Michigan

SEDAC
Annual
Work Plan
V(0), FY96

Prepared Under Letter Contract NAS5-32632

APPROVED BY:

Mr. Thomas Parris — 6/30/95 Date
SEDAC Project Scientist (Acting)

William Schanerberger — 6/30/95 Date
Mr. William Schanerberger
SEDAC System Engineer

Robert S. Chen — 6/30/95 Date
Dr. Robert S. Chen
SEDAC Manager

July 1995

Preface

This proposed *Annual Work Plan* is submitted as requested by NASA Goddard Space Flight Center (GSFC) in a letter dated 2 May 1995. The Plan, in its final form, will represent Contract Data Requirements List Item 16 in Option Year One of Contract NAS5-32632 for the Development and Operation of the Socioeconomic Data and Applications Center (SEDAC). The current version of the Plan is submitted by 1 July 1995 in order to meet the review schedule outlined by GSFC which will culminate in a final approved version by 1 October 1995.

This document is based on guidance provided by GSFC and follows the outline detailed in the Earth Observing System Data and Information System (EOSDIS) Distributed Active Archive Center (DAAC) Strategic/Management Plan (SMP), dated 22 March 1995. The Annual Work Plan describes the work to be performed by SEDAC during the "target" one-year period, 1 November 1995 through 31 October 1996 (referred to in this document as FY96). It should be noted that Option Year One of the above-mentioned contract begins 28 June 1995 and runs through 27 June 1996; if exercised, Option Year Two of the SEDAC contract will begin 28 June 1996 and run through 27 June 1997.

This version of the document has been sent to the members of the SEDAC User Working Group (UWG) for their review and comments. It is expected that the UWG as a whole may recommend modifications to the Plan at their planned 6-8 September 1995 meeting.

Questions or proposed changes should be addressed to:

SEDAC Manager
CIESIN
2250 Pierce Road
Saginaw, MI 48710
Tel 517-797-2611

Executive Summary

The Socioeconomic Data and Applications Center (SEDAC) is one of nine Distributed Active Archive Centers (DAACs) in the Earth Observing System Data and Information System (EOSDIS) of the National Aeronautics and Space Administration's Mission to Planet Earth (MTPE) Program. SEDAC is operated by the Consortium for International Earth Science Information Network (CIESIN) based in Saginaw, Michigan.

As indicated in the SEDAC Statement of Work (SOW), SEDAC has two key missions. The first is to support the MTPE program by contributing to its goal of translating scientific understanding into tangible benefits to the American people by developing new policy-oriented information products that synthesize Earth science and socioeconomic data and by providing the resulting operational data and information services to the public. SEDAC's second mission is to serve as a two-way "Information Gateway" between the socioeconomic and Earth science data and information domains.

Since the start of its contract (28 June 1994), SEDAC has established a basic System Operating Capability that includes three major areas of activity: *1)* interactive access to integrated data on population, land cover, and emissions for the U.S.; *2)* interactive tools for visualization and analysis of the inputs and outputs of selected integrated assessment models (IAMs) of climate change; and *3)* a "Gateway" system designed to provide social and natural scientists and other users with search-and-order capabilities across distributed catalogs of data relevant to the human dimensions of global environmental change, including directory entries held by the Global Change Master Directory (GCMD). As part of these efforts, SEDAC has begun to acquire and disseminate selected human dimensions datasets including a number of unique georeferenced population data products and to compile a significant collection of directory entries for human dimensions data held by institutions around the world.

SEDAC is also working with a number of "proof of concept" and prototype applications that could serve as a basis for implementing future operational services in support of SEDAC's missions. These applications include a Policy Instruments Data Base that provides online query capabilities against a data base of international environmental treaties and associated status information; a range of online guides that include scientific literature and technical documentation concerned with human dimensions data and research; a structured toolkit for communications between HyperText Markup Language (HTML) documents and relational data bases; a set of data and models that permit assessment of the potential risks of stratospheric ozone depletion for public health; and an interactive tabulation system that utilizes advanced parallel-processing techniques to provide rapid access to large tabular datasets.

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During the target year of FY95 (1 November 1995 through 31 October 1996), SEDAC plans to enhance its current System Operating Capability in four specific areas:

1) Expand the range and functionality of the population, land cover, and emissions data and interactive tools, including the addition of more detailed data for the U.S., 1990 census data for Mexico and, if possible, population data for part or all of Canada and China, and the development of higher-resolution products and services for smaller regions.

2) Continue adding selected IAMs, IAM scenarios, and associated IAM guides to the Model Visualization and Analysis (MVA) services. Also, explore development of additional cross-model comparison tools and continue to support the use of MVA services in efforts to make IAMs more useful to and usable by decision makers.

3) Continue to expand the number and variety of directory and inventory servers accessible through the Gateway software, to improve the Gateway functionality and useability and its interoperability with the EOSDIS Information Management System (IMS), and to support continued population of accessible servers with appropriate directory- and inventory-level metadata.

4) Design and implement a third set of operational services in an applications area to be determined with the guidance of the SEDAC UWG according to the process outlined in the SEDAC Statement of Work. It is anticipated at this point in time that this set of services would relate either to policy instruments data, stratospheric ozone depletion and health, or population and land use/cover change in China.

In addition, SEDAC will devote considerable effort towards integration of all first year prototype elements into a more structured object-oriented architecture that will provide a flexible framework for SEDAC's current and future operational services. This will enhance SEDAC's ability to respond to user demands, to put new services in place, to build useful linkages between specific SEDAC services and with external services (such as those provided at other DAACs), and to utilize resources more efficiently and effectively.

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1.0 Science Support Objectives

SEDAC's Statement of Work (Revision 2, 9 August 1994) states that:

> Earth science research results, often in the form of new derived science products (e.g. georeferenced arrays of geophysical parameters), must be used in combination with socioeconomic data and information to analyze the effects of changing environmental conditions, "natural" or human-induced, on human activities such as agriculture, energy consumption, urban planning, etc. - in sum, the "human dimensions of global change".
>
> In turn, this requires an applications development effort to develop new policy-oriented information products that synthesize Earth science and socioeconomic data. This effort must include development of ways of making Earth science data, socioeconomic data, and synthesized combinations of these data, or products derived from combinations of these data readily useful to public policy analysts and policy makers....
>
> An institutional element within the MTPE program is needed to carry out the applications development effort (including gaining access to needed combinations of EOS and other Earth science products and socioeconomic data) and provide the resulting operational data and information services to the public policy analysis and policy making community. SEDAC, as an EOSDIS DAAC, will be this institutional element.

The SOW then states the SEDAC missions as:

> The first priority mission of the SEDAC is to perform the policy applications development and consequent operational functions outlined above.
>
> SEDAC will take advantage of its access to information describing Earth science and socioeconomic data and information to perform a second priority collateral function of serving as a two-way Information Gateway between the socioeconomic and Earth science data and information domains. SEDAC will develop and operate a directory capability, interoperable with the Global Change Master Directory and EOSDIS, providing the socioeconomic community with information about Earth science products and the Earth science research community with information about socioeconomic data. As a part of the gateway effort, SEDAC will also provide socieoconomic users and Earth science users access to those data and information either acquired by SEDAC or made available by SEDAC through cooperative agreement with the source in pursuit of its first priority mission area.

> In order to perform these functions, SEDAC's services must include identifying and locating a wide range of socioeconomic data, and SEDAC must be linked to the Earth science DAACs and thus have access to information describing a wide range of Earth science data.

At the May 1995 meeting of the SEDAC User Working Group (UWG), both the NASA Program Scientist, Dr. Nancy Maynard, and the UWG emphasized the need to seek a balance between the two major SEDAC missions. The UWG strongly endorsed SEDAC's "Gateway" function as a way to encourage more interdisciplinary and integrated work involving both the social and natural sciences. The UWG emphasized the importance of addressing a wide range of users, not just those specifically involved in "policy". It recommended:

> Based on briefings, deliberations, and discussions at our meeting the most important guidance that the UWG can give to both the SEDAC and to NASA, at this time, is that: SEDAC needs to expand its current user focus beyond to policy community to include a broader suite of socioeconomic research and operational data users. *[Note to UWG: We will be sure to use the final language from the May meeting report]*

1.1 Applications Development

SEDAC's efforts to develop new applications of social and natural science data useful for decision making are coordinated through the development and maintenance of the Policy Applications Development Plan (PADP). The PADP reviews the key science issues relevant to NASA's MTPE Program and the overall U.S. Global Change Research Program (GCRP), identifies opportunities for developing new applications and reaching new user communities, documents the process of selecting opportunities for further SEDAC exploration and implementation, and, for the selected application areas, details the key activities needed to identify and involve users in their design and implementation.

Based on a review of relevant U.S. GCRP and NASA documents, the first-year version of the PADP (September 1994) identified the following three priority science issues:

- global climate change (including seasonal and inter-annual fluctuations);
- stratospheric ozone depletion; and
- land use and ecosystem change (including loss of biodiversity, desertification, and deforestation).

These issues were reviewed in detail by the SEDAC UWG at its May 1995 meeting.

The PADP highlighted a number of opportunities for developing new applications related to these science issues and selected two key application areas for initial SEDAC development:

1) Population, land use, and emissions; and

2) Visualization and analysis of integrated assessment models of climate change.

The first application area represents a unique effort to link a range of georeferenced demographic and other socioeconomic data products with remote sensing data related to land cover and use. In particular, the project is utilizing the Seasonal Land Cover characterization dataset developed by the EROS Data Center (EDC) for the U.S. and under development for Mexico and Canada. Utilizing selected data sets available from the U.S. Census, SEDAC has developed a matching 1-kilometer gridded demographic dataset and an associated set of tools to permit interactive spatial and criteria-based queries of the integrated data set. Gridded population datasets have also been produced for Mexico (1-kilometer resolution) and for the world as a whole (5 minutes latitude/longitude) under prior work by CIESIN through a grant from NASA. This set of tools and data is proving to be of high interest and utility to a wide range of scientific and applied users interested in interactions between human activities and the land surface.

The second application area focuses on the emerging research area of integrated assessment. As highlighted in several recent editions of the U.S. GCRP Program report *Our Changing Planet*, integrated assessment is expected to be one of the key ways in which scientific results will be translated into information and knowledge useful for decision making. Integrated assessment models (IAMs) in some cases directly utilize remote sensing data as inputs and in all cases indirectly incorporate scientific knowledge derived from space-based measurements. SEDAC has developed a set of services that will provide direct access to publication-quality IAM results, improve access to detailed IAM documentation, and allow comparison and visualization of IAM results. Though the primary target of these services is the range of decision and policy makers who may utilize the results of IAM research, it is apparent that many in the IAM and human dimensions research communities are interested in these services as a tool to enhance model transparency, comparability, and usability.

Both application areas have been reviewed and are being closely monitored by the SEDAC UWG to ensure that they meet user needs and maintain high levels of scientific and technical quality. As required by the SEDAC SOW, the PADP will be updated in consultation with the SEDAC UWG by the fall of 1995. It is expected that the updated PADP will include enhancements to the two application areas described above and will add an additional application area for further SEDAC development.

1.2 Gateway Development

SEDAC's efforts to improve linkages between the social and natural science data and information domains are coordinated through the development and maintenance of the Information Gateway Plan (IGP). The IGP identifies key areas of interdisciplinary research related to global change, as documented in various reports of the U.S. GCRP, the National Research Council (NRC), the Human Dimensions of Global Environmental

Change Programme (HDP) of the International Social Science Council, and other key organizations. It reviews the needs of social scientists for access to earth science and interdisciplinary data and information resources, and the needs of earth scientists for access to social science and interdisciplinary data and information resources.

Social science data are collected and held in many different ways for many different purposes by many different organizations around the world. Developing consistent and reliable data on human activities and conditions with the global coverage required for some types of interdisciplinary research can therefore be difficult. Similarly, finding social science data of sufficient resolution and quality to match that available in the natural sciences can also be a challenge. On the other hand, in some instances historical data in the social sciences are much more complete and consistent than that available in the natural sciences. Unfortunately, the difficulties of identifying and accessing such data can impose significant barriers to their use.

With this in mind, SEDAC is participating actively in the development of the Information Cooperative, a CIESIN initiative to pull together a worldwide network of institutions that hold social science and interdisciplinary data and information. In particular, SEDAC is helping to develop the technological infrastructure that allows these institutions to make their existing electronic data catalogs and inventories more accessible to a wide range of users through a common user interface. SEDAC is also working closely with selected Information Cooperative partner organizations to help gain access to key data needed for applications development. Such institutional arrangements are vital since, in order for SEDAC to provide operational services on a continuing basis, it must have long-term access to the updated data needed for that service.

The IGP also outlines eight main interdisciplinary areas for identification of data and data sources and the development of metadata. These are:

- Population dynamics
- Land and freshwater resources
- Industry and energy
- Economic activity
- Policy and institutions
- Agriculture and food security
- Human and environmental health
- Human attitudes, preferences, and behavior

Review of SEDAC's Information Gateway activities at the May UWG meeting resulted in strong support for SEDAC's efforts in this area and recommendations that SEDAC move aggressively to identify key datasets especially in the areas of:

- land, air and freshwater (e.g., land use/cover, air/water quality, biodiversity, infrastructure and topography);

- population dynamics (e.g., population density, age distribution, migration);

- economics (e.g., industry, commerce, energy, agriculture);
- public health (e.g., births, mortality, morbidity); and
- policy and institutions (e.g., treaty texts, conventions, protocols, ratification status).

2.0 Past Year Accomplishments

Since the start of its first-year contract in June 1994, SEDAC has completed an array of contract deliverables and milestones that have culminated in an overall System Operating Capability. Key elements of this capability are:

1) A Gateway system which provides distributed search-and-order capabilities across widely scattered directory and inventory servers using a common user interface. Beta versions of the Gateway clients are now available via the Internet for UNIX X-Windows and Microsoft Windows-compatible personal computers.[1]

2) A collection of human dimensions metadata with more than 480 directory and 1,700 inventory entries, guides for 32 datasets, and 43 directory entries in the GCMD.

3) An active archive of more than 60 datasets including several unique georeferenced population data sets and a file transfer protocol (ftp) archive of reprocessed U.S. Census data. During its first four months, the ftp archive served more than 200 unique hosts per month and delivered more than 20,000 files and 10 gb of data.

4) Memoranda of Understanding (MoUs) or other agreements with more than a dozen different organizations (partners in CIESIN's Information Cooperative) to share metadata, provide access to data, and/or collaborate in other ways.[2]

5) Online interactive access to an integrated population/land cover dataset for the coterminous U.S. that ties together 1-kilometer seasonal land cover data from EDC with gridded population and housing data.

6) A set of query tools for tabular and text data accessible over the Internet. These include the Ulysses tabulation system, which provides interactive access to the U.S. Census Public Use Microdata Samples for multiple decades, and the Policy Instruments Data Base, which provides online query capabilities against a data base of international environmental treaties and associated status information.

7) An integrated set of model visualization and analysis services including online guides for the IMAGE 2.0 and MiniCAM integrated assessment models, an overall IAM thematic guide, and tools for displaying and re-aggregating model input and output data.

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[1]The Gateway system has recently won first prize in the Environment, Energy & Agriculture category of the prestigious 1995 Computerworld Smithsonian Awards Program and will be part of the Smithsonian's permanent research collection and a public exhibit at the National Museum of American History.

[2]Key partners relevant to SEDAC applications development include the International Population Center of the U.S. Bureau of the Census (formerly the Center for International Research), EDC, the International Union for the Conservation of Nature (IUCN), the National Institute on Public Health and Environmental Protection (RIVM) in the Netherlands, the United Nations Environment Programme/Global Resource Information Database (UNEP/GRID), the World Conservation Monitoring Centre (WCMC), the World Resources Institute, and key institutions in China.

3.0 Target Year Plans

3.1 Development

This section describes the activities related to the ongoing development of SEDAC systems and subsystems according to the categories of activity specified in the EOSDIS SMP.

3.1.1 DAAC-Unique V0 Development

This category includes the continued development of a local data and information system to meet the Version 0 (V0) functional requirements. SEDAC will continue to implement its DAAC-unique V0 data and information system (i.e., the SEDAC Gateway) according to requirements analysis and design efforts conducted prior to the target year, as documented in the Requirements Analysis Report, Functional and Performance Requirements Specification, Architecture and Operations Concept, and System Design Document. This includes development of additional functionality in SEDAC Client, Interoperability, Data Server, Data Management, Data Processing, and Ingest subsystems as well as work with HDF (Hierarchical Data Format) and SDTS (Spatial Data Transfer Standard) for data integration, ingest, and distribution.

Figures 3.1 and Table 3.1 show the computer hardware that supports major SEDAC services.

The EOSDIS V0 Information Management System (IMS) was designed and implemented for the other eight DAACs (GSFC, EDC, ASF, NSIDC, JPL, MSFC, LaRC, and ORNL). SEDAC's Gateway system has been implemented from separate requirements but with the goal to be interoperable with the EOSDIS V0 IMS for directory, guide, and inventory-level information searching. The system interface design of the SEDAC Gateway is flexible enough to make possible similar interoperability with the EOS Core System (ECS) Version 1 (V1) and Version 2 (V2) system components that will replace the EOSDIS V0 IMS in later years.

SEDAC will update the aforementioned documents to reflect new or changing requirements derived from experience with the operational system and input from SEDAC users. The SEDAC data and information system, including subsystems for information management, data archive and distribution, and application services, will continue to undergo an evolutionary development process, including the operational implementation of successful prototypes.

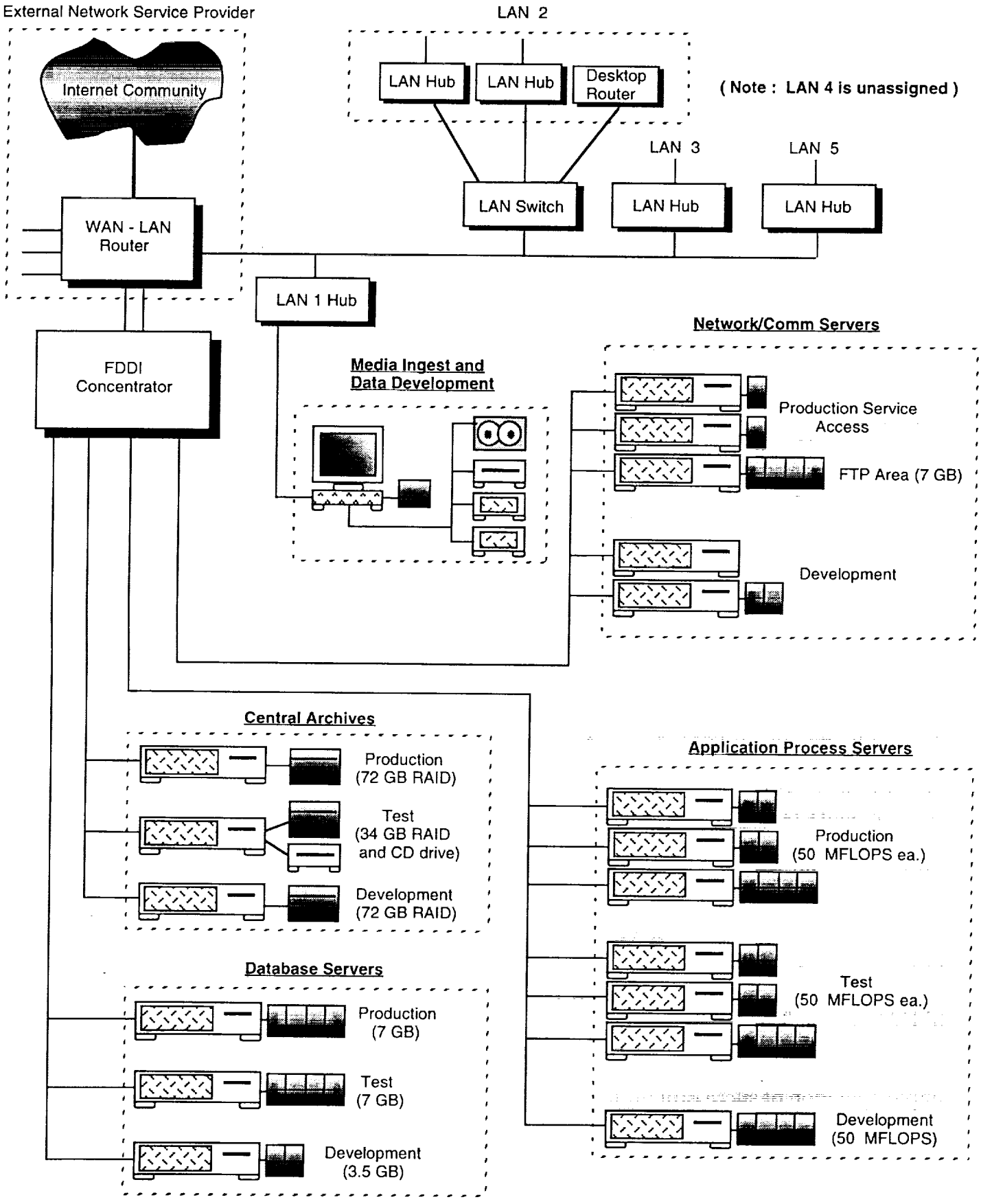

Figure 3.1-1. Configuration of SEDAC Computing Resources

Table 3.1-1 DAAC System Configuration

Site/Function	System	Operating System	Database & File Manager	Memory (MB)	Disk (GB)	Jukebox (GB)	Peripherals/Media	Other
SEDAC 950630								
IMS (Gateway)								
WWW	Sparc20	SunOS 4.1.3		64	1.8			Internet Access
LC, LCh, WWW	Sparc20	SunOS 4.1.3		128	1.8			Internet Access
FTP	Sparc2	SunOS 4.1.4		32	7.2			FTP Access
LC, LCh, WWW	Sparc5	Solaris 2.4		32				Development
LC, LCh, WWW	Sparc10	SunOS 4.1.4		64	3.6			Development
DADS (Data Servers)								
DA	Sparc20	SunOS 4.1.3	NFS	32	72.0		RAID System	Production
DA	Sparc5	SunOS 4.1.4	NFS	64	34.0		RAID System, CD	Testing
DA	Sparc10	SunOS 4.1.4	NFS	32	72.0		RAID System	Development
DB, LS, OT	HP735	HP-UX 9.01	ORACLE	32	7.2			Production
DB, LS, OT	HP735	HP-UX 9.01	ORACLE	144	7.2			Testing
DB, LS, OT	HP735	HP-UX 9.01	ORACLE	48	3.6			Development
DD, DI, PM	SparcIPX	SunOS 4.1.4		32	1.8		9-Track,CD Recorder,8mm,4mm,3.5"	
PGS (Applications)								
ICA	HP735	HP-UX 9.01		144	3.6			Production
ICA	HP735	HP-UX 9.01		144	3.6			Production
MVA, PLE	HP735/125	HP-UX 9.05		32	7.2			Production
ICA	HP735	HP-UX 9.01		144	3.6			Testing
ICA	HP735	HP-UX 9.01		144	3.6			Testing
MVA, PLE	HP735/125	HP-UX 9.03		160	7.2			Testing
ICA, MVA, PLE	HP735	HP-UX 9.01		144	7.2			Development

Function Key:

PLE = Population, Land Use, and Emission Products	DB = IMS Database Server	PM = Pre-Mastering
MVA = Model Visualization and Analysis	DA = DADS Archive	FTP = FTP Staging Disk
ICA = Interactive Census Data Analysis	DD = DADS Distribution	FM = File Manager
LS = Local IMS Server	DI = DADS Ingest	WWW = World Wide Web
LC = Local IMS Client	OT = Order Tracking	
LCh = Local Character IMS	PGS = List Product Produced	

3.1.2 *Version 0 System Level Tasks*

This category includes SEDAC's participation in EOSDIS V0 system level activities. SEDAC will continue to actively participate in V0 development activities including technical meetings and teleconferences. The development of the SEDAC-to-V0 IMS bridge will continue, including enhanced inventory interoperability as well as interoperability at the directory and guide levels. SEDAC will continue to assist NASA and Hughes in the development of a V0-to-SEDAC bridge, which would make the SEDAC local archive available to V0 users. V0 System Level activities will be largely completed in 1995, phasing out as the transition from V0 (Release 6) to ECS (Release A) is completed.

3.1.3 *Version 0 Sustaining Engineering*

This category includes enhancements or modifications to the SEDAC system that are within the requirements to V0 and the functionality of the operational system. This includes implementation improvements such as increased performance or fault tolerance, as well as other enhancements which may be necessary to ensure that the SEDAC system meets the needs of its users. Sustaining engineering will begin in 1995 as initial operational capability is achieved and will continue throughout the planning period.

3.1.4 *ECS Prototyping*

This category includes prototyping activities that are in support of ECS development. SEDAC subsystems are not components of the ECS design but rather external interfaces to it. Because of this, prototyping performed by SEDAC is largely in support of its own system development. However, there will be some SEDAC prototype development directly related to the system's ability to interoperate with other external components for information searching.

3.1.5 *DAAC-Unique Extensions to ECS*

DAAC-unique extensions are defined as those capabilities that provide enhancements to local ECS components. As mentioned in the previous sections, ECS is expected to integrate with SEDAC through external interfaces only and will not "replace" SEDAC-local systems. Therefore, as defined, this section does not apply to SEDAC.

3.2 ECS Interface

3.2.1 *Focus Teams and Version 0 Liaison*

SEDAC will participate in ECS development activities, including Focus Team meetings, technical reviews, and system-level activities. SEDAC will work with ECS staff to provide support on the implementation of SEDAC interoperability. This will primarily

involve the evolution of the SEDAC-V0 gateway to support ECS Release A and planning for subsequent releases of ECS.

3.2.2 ECS Contractor Direction

ECS will not have any on-site activities at SEDAC. Therefore, this category of activity does not apply.

3.3 Dataset Acquisition and Ingest

3.3.1 Dataset Acquisition Activities and Plans

Based on the guidelines provided by SEDAC UWG and the SEDAC Project Scientist, SEDAC staff will continue to identify key data and information inputs that are required for application development tasks active during the target year. It is expected that two tasks initiated during SEDAC's first year will continue active development through at least the summer of 1996: *1)* population, land use, and emissions; and *2)* visualization and analysis of integrated assessment models of climate change. By the beginning of the target year, it is also expected that another application development task will have been approved by the UWG (via its approval of the updated Policy Applications Development Plan in August or September 1995) and initiated at some level of activity (see section 3.4 below). Current candidates include policy instruments data, stratospheric ozone depletion and health, and population and land use/cover change in China. Acquisition of additional datasets will likely be necessary once the new application area has been defined. In addition, under Task 2.1, SEDAC is expected to continue a modest level of exploration of new potential applications, which could entail acquisition of selected data sets for internal evaluation and "proof of concept" efforts.

The SEDAC Science Data Plan (SDP) identifies and prioritizes the datasets that need to be acquired and archived in SEDAC local archive or made available through the SEDAC Information Gateway. The SDP also describes datasets and services including source, size, form, associated levels of service, and other pertinent information on how data products are archived and managed. The next update to the SDP is due in November 1995. Initial assessments of data needs for the model visualization and analysis and policy instruments tasks are presented in tables 3.1 to 3.3. These tables include some datasets listed in the current SDP already acquired or that may be acquired prior to the start of the target year. In addition, it is expected that data needs will evolve significantly prior to the beginning of the target year based on further planning efforts, UWG review, and internal and external feedback.

Table 3.3-1 Integrated assessment models targeted for acquisition.

Model	#Scenarios	Estimated Volume
AIM V1.0	TBD	TBD
CETA	TBD	TBD
CSERGE	TBD	TBD
DICE	TBD	10 MB
GCAM V1.0	TBD	1000 MB
ICAM-1	TBD	20 MB
ICAM-2	TBD	1000 MB
IMAGE 1.0	TBD	20 MB
IMAGE 2.0	2	500 MB
IMAGE 2.1	10	3000 MB
ISM	TBD	TBD
MiniCAM V1.0	18	10 MB
MiniCAM V1.1	36	30 MB
MiniCAM V1.2	54	60 MB
RICE	TBD	50 MB
TARGETS	TBD	TBD

Table 3.3-2 Polygon coverages needed to support model visualization and analysis.

Coverage	Estimated Volume
Global Subnational Boundaries (Second Tier)	TBD
Global Watershed Boundaries (First and Second Tier)	TBD
Others as defined by UWG	TBD

Table 3.3-3 Projected data needs of the proposed policy instruments data activity.

Data Set Name	Provider	Est. Vol.
International Treaties Database	IUCN	5 MB
Social Indicators of Development 1995	World Bank	1 GB
Trends in Developing Economies 1995	World Bank	100 MB
UNCED NGO text	UNCED	500 MB
national level environmental parameters for proof of concept integration (TBD)	TBD	3 GB
Green Globe text	Fritzhof Nansen Institute	10 MB
Green Globe maps	UNEP Arendal	100 MB
text, status, & summary information about important new international agreements	various	10 MB

Based on the priorities documented in the SDP, the SEDAC Information Gateway team will develop partnerships with organizations for accessing datasets required for various applications tasks. The CIESIN Information Cooperative's infrastructure and international network of organizations will be utilized when appropriate to carry out these activities. In selected cases, the Information Gateway team will identify interdisciplinary science domain datasets for enhancement, integration, and dissemination. The Information Gateway team will make contacts, negotiate data access agreements and work plans, guide site development activities, and maintain good relations with each site. Archives and Acquisitions (AA) staff will participate in this activity and will also serve as the primary support for CIESIN's Information Cooperative's distributed archive activities for accessing data and information. In other cases, datasets that are required for developing application products will be acquired and archived in the SEDAC local archive.

SEDAC will also coordinate its data acquisition efforts with other DAACs as appropriate. For example, the population, land use, and emissions task will continue to coordinate with EROS Data Center (EDC) on acquisition of the Seasonal Land Cover dataset as new regions become available. Other datasets likely to be needed include the C1 & C2 cloud analysis data products of the International Satellite Cloud Climatology Program (ISCCP) available from the Langley Research Center (LaRC) DAAC and the Total Ozone Mapping Spectrometer (TOMS) version 7 data available from Goddard Space Flight Center (GSFC) DAAC.

AA staff will develop acquisition and dissemination plans for acquiring datasets that are described in the SDP. As appropriate, AA staff will then negotiate with sources and obtain the necessary permissions to use and disseminate data targeted for SEDAC purposes. AA staff will acquire the data and record the information that is required to track the acquisitions process. In cooperation with Operations staff, AA staff will ingest the data into the development environment where it will be checked for quality. Conditioning, preparation of documentation, and dissemination will be conducted according to the plans established for each dataset. When the development stage is completed, Operations staff will transfer each completed dataset to the production environment. Each dataset is assigned a date for review and update, as appropriate. Updates are performed according to initial plans, applicable guidance from the SEDAC UWG, and review based on use and user feedback.

Metadata Administration and AA staff will implement the process of developing metadata and archiving data required for the applications development tasks. This includes initiating and maintaining good relations with external organizations and with other SEDAC priority national and international data sources with regard to data and metadata use, access, appropriate access mechanisms, and updates of data and metadata.

3.3.2 *Expected Data Volumes*

It is estimated that each applications development task will require acquisition of 7 new datasets during the target year, each of which will be reprocessed, integrated, and disseminated.[3] The volume of each dataset is estimated to be 1.310 gigabytes (GB). Assuming 3 active application development tasks and two exploratory efforts, the total number of datasets ready for dissemination by the end of the target year would be about 35. SEDAC domain dataset acquisition is assumed constant at 1 per domain plus 4 additional supporting and integrated datasets, for a total of 12 during the target year. Experience indicates that in addition to the above datasets, an equivalent number of datasets is needed for internal working access, as reference materials, or as supporting data for other high priority datasets.

The total volume required for disseminating SEDAC's initial 63 datasets is 33.4 GB. Data conditioning, acquisition, capability demonstration, prototyping, testing, and storage space for datasets for internal use have required on the order of 40 GB. These volume estimates allow for datasets expected to be acquired by the beginning of the target year. During the target year, an additional 47 x 1.310 GB of storage space, or 61.57 GB, is expected for a total of about 134.97 GB by the end of the target year.

3.4 Mission Support

Unlike other DAACs, SEDAC is not directly supporting an EOS instrument team or field campaign. Instead, SEDAC has the two primary missions described in Section 1.0: *1)* developing new applications of social and natural science data useful for decision making and *2)* improving linkages between the social and natural science data and information domains. At any given time, SEDAC can only support a small number of data and application development efforts.[4] To date, SEDAC has initiated two such efforts concerned with population, land use, and emissions and visualization and analysis of integrated assessment models of climate change. In addition, SEDAC has endeavored to develop linkages with key data institutions related to these application development efforts, working in support of, and in collaboration with CIESIN's Information Cooperative program. The work plans for each of these efforts are described in somewhat greater detail in this section. However, it should again be emphasized that SEDAC is obligated under contract to articulate its activities in several required reports that are due in the late summer and fall of 1995. These reports must be reviewed and approved by the SEDAC UWG as well as by GSFC. Thus, the plans listed here must be considered preliminary and subject to change as the result of these subsequent planning activities.

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[3] Note that in many instances users are not only interested in any integrated products and services that SEDAC may provide, but also in the original datasets—or the value-added versions of the datasets that may have been produced during the development effort. The latter is clearly the case in the case of the Population, Land Use, and Emissions task.

[4] Recallthat SEDAC's mission indicates that SEDAC should not only develop new applications, but also put them into operation on a long-term basis.

3.4.1 Population, land use, and emissions

SEDAC will continue to upgrade the level of service provided by the Population, land use, and emissions based on UWG guidance, user feedback, and continued planning efforts according to required SEDAC procedures. The planned work is expected to proceed along three levels or scales of data and applications development:

1. Continental/global scales, coarse resolution

- Focus on large areas (continents) or the globe at a relatively coarse resolution, e.g., 5 minutes of latitude/longitude.
- Develop linkages with other coarse resolution natural science data products (e.g., being developed at other DAACs such as Goddard).
- Add overlays for additional boundaries, e.g., major river watershed basins, subnational administrative units, metropolitan areas.
- Apply existing visual query and extraction capabilities and tools to linked or integrated datasets.
- Explore potential linkages with the MVA services.

2. National scale, medium resolution

- Continue integrating EDC 1-kilometer seasonal land cover data as they become available with available georeferenced population data, e.g., for Mexico and Canada. This will entail using current gridding methods (proportional allocation, pycnophylactic smoothing, and geostatistical methods) on a common map projection.
- Explore other possible sources of land cover data for other countries (e.g., China), potentially at different levels of resolution.
- Add more detailed boundary information, e.g., watershed boundaries.
- Generate U.S. census data for 1980 for the Archive of Census-Related Data and, if possible, integrate with 1990 data. This will require efforts to: *1)* compensate for suppression of data in the 1980 Census files using an apportionment method developed by J. Blodgett of the Missouri State Data Center; and *2)* match the 1980 census geography to the 1990 census geography using GIS methods.
- Develop more sophisticated query engines. For example, users may wish to specify defined boundaries (e.g., Public Use Microdata Areas or Congressional districts) and obtain disaggregated or re-aggregated data corresponding to the areas selected, regardless of the original form of the data.

- Adapt the Ulysses tabulation and extraction software to deal with the U.S. Census Summary Tape Files 4 datasets, and explore linkages with the spatial query capabilities.

3. Subnational/regional level, high resolution

- Focus on a multi-state U.S. region such as the Great Lakes as recommended by the SEDAC UWG.
- Provide user capability to re-grid at 1-kilometer resolution or better, using Census block (rather than block group) data.
- Develop linkages between long-form data available at block group level (e.g., STF3A and STF4A data) and the short-form data available at the block level (STF1B).
- Explore alternate sources of higher resolution remote sensing data.
- Explore gridding methods for data items other than population or housing unit counts.

3.4.2 *Visualization and analysis of integrated assessment models of climate change*

SEDAC will continue to upgrade the level of service provided by the Visualization and Analysis System for Integrated Assessment Models of Climate Change based on UWG guidance, user feedback, and continued planning efforts according to required SEDAC procedures. The planned work is divided into four basic categories:

1. Archive, acquisitions, and metadata

- Acquire and archive models, input scenarios, output datasets, related documentation, and permissions for the models listed in Table 3.1.
- Develop metadata (DIFs and inventory descriptions) for the materials described above. Incorporate these metadata into the SEDAC Gateway.

2. Guide preparation, updates, and expansion

- Update and expand the reference materials accessible via the Thematic Guide to Integrated Assessment Modeling of Climate Change.
- Update and expand the reference materials accessible via the Model Guides for IMAGE and MiniCAM.
- Create new Model Guides for additional models as they are ingested into the system.

- Create new Scenario Guides for new scenarios as they are ingested into the system.

3. Enhancement of the Model Visualization and Analysis System

- Incorporate additional scenarios and model runs as described in Section 3.3.
- Enhance data ingest utilities to reduce the amount of manual intervention required for scenario and model run ingest.
- Extend browse services to support the extraction and delivery of specific variables and computations to the user in tabular reports and file formats.
- Extend browse services to allow users to order high quality color prints of specific products.
- Extend spatial aggregration services to support additional boundary coverages and support a broader range of spatial aggregation algorithms.
- Develop graphics to support the visualization of stochastic models.
- Develop tools to allow intercomparison across models.
- Enhance the range of visualization and analysis services to include:
  - Additional graph types;
  - Zoom, Pan, Scroll;
  - Variable definition using algorithmic expressions with type checking and simple unit conversions;
  - Descriptive statistical analysis procedures; and
  - Support a broader range (and the advanced features of) WWW Browsers (e.g., Hot Java).
- Experiment with services to support the execution of selected models.

4. Support workshops and curriculum development efforts

- Develop publication based on NATO Advanced Research Workshop on Integrated Assessment of Global Environmental Change: Science and Policy held in October, 1995.
- Support the International Institute for Applied Systems Analysis (IIASA) International Environment Commitments (IEC) Project Policy Simulation Exercise final run, scheduled for June 1996.
- Support emerging university-level course development in global modeling (e.g., UNESCO, University of Michigan, Michigan State University, Harvard University)

3.4.3 *Other possible application development activities*

SEDAC also performs a relatively small amount of exploratory work designed to develop concepts, prototypes, and plans for future application projects. The SEDAC UWG monitors the progress of these exploratory efforts, provides advice about which topics should be explored, and ultimately determines whether a proposed project should be elevated to a full-scale data and applications development effort.

In addition to these efforts, SEDAC plans to organize cooperative activities with the other DAACs to explore potential new applications of EOS data. In particular, SEDAC plans to host at least one quarterly DAAC Managers meeting at its Saginaw headquarters and to invite DAAC Project Scientists to participate in this.

Based upon advice received from the UWG, SEDAC is currently exploring three potential application development efforts. It is expected that, by the beginning of the target year, one of three will be selected to become an active applications development effort. If so, the two documents, the PADP and SDP, will provide much more detail on the work planned for this application. Therefore, only some general comments about possible future development of the three potential efforts are given here:

1. Policy instruments data

- Develop new prototype capabilities in the Policy Instruments Data Base (PIDB),[5] including metadata search capabilities and integration of treaty information with national socioeconomic parameters, collections of relevant textual information, and national environmental parameters, including those derived from remote sensing.
- Reconstruct the prototype into a more robust and efficient system integrated with SEDAC's systems infrastructure.
- Develop keywords associated with each international environmental agreement to support the use of keyword searching tools to search for relevant NASA and other data and information resources.
- Create an online guide to the use of remotely sensed earth science information in negotiating and implementing international environmental agreements, with links to existing thematic, organizational, and dataset guides.
- Organize a workshop on techniques for integrating treaty information with national-scale socioeconomic and environmental parameters in 1996.

[5] The PIDB is a "proof of concept" integrated database accessible over the Internet using the World Wide Web (WWW). It presently contains the text of multilateral environmental treaties, treaty summaries and status reports, linkages to online resources maintained by treaty secretariats, and selected national-level time series of socioeconomic and environmental indicators.

2. Stratospheric ozone depletion and human health

- Improve the estimates and model of ground-level exposure to ultraviolet radiation originally developed under prior NASA funding in collaboration with the University of California at Santa Barbara and the University of Michigan.

- Build links between this model and selected DAAC datasets such as those mentioned in section 3.3.

- Improve the utilization of georeferenced population data taking into account the new datasets now available through SEDAC and the differential susceptibilities of different groups to UV-B increases.

- Develop links with public health data relevant to key health effects (e.g, skin cancer, non-melanomas, eye disease and disorders, and immunosuppression).

- Develop links within the public health and medical communities to explore levels of interest and modes of access and utilization.

3. Population and land use/cover change in China

- Pull together various sources of land use/cover change data relevant to China, including datasets developed in part by the China and Time and Space (CITAS) project under a previous NASA grant. These include a Geographic Information System (GIS) of administrative geography during the PRC period with associated socioeconomic variables; the fundamental GIS of China, a 1:1 million coverage of topographic, hydrological, and transportation derived from DCW and the Land Use Map of China; land use coverages for all of China, derived from the Land Use Map of China, and if accessible, from recent photointerpretation of remotely sensed data; and land use change estimates derived from remotely sensed data sources such as AVHRR.

- Continue to explore potential users and to develop relationships with relevant Chinese institutions.

3.4.4 Information Gateway development

SEDAC will continue to pursue the development of Information Gateway relationships based on UWG guidance, continued planning efforts according to required procedures, and key windows of opportunity. Actual priorities during the target year will be determined by the update to the Information Gateway Plan due in August 1995 and the SDP update. In general, planned work is expected to proceed along three major lines:

1. Support for applications development

- Utilize existing Information Cooperative data sharing or access agreements with organizations that hold important datasets needed for active or prospective SEDAC application development activities.
- Generate interest in such organizations in collaboration on or contributions to development of value-added services (e.g., the PIDB).
- Where agreements do not yet exist, pursue the development of appropriate agreements that permit SEDAC access to needed data or information resources.

2. Identification and description of key human dimensions data

- Identify key datasets or information describing the datasets especially in the areas recommended by UWG such as: land, air and freshwater; population dynamics; economics; public health; and policy and institutions.
- Explore possible sources by developing informal relationships with relevant data producers and research organizations.
- Describe the datasets by developing directory metadata.

3. Enhancement of distributed metadata holdings

- Pursue metadata sharing or access agreements with organizations that hold important metadata resources, e.g., catalogs or inventories of social science or interdisciplinary data or unique guide resources relevant to human dimensions data or research.
- Generate interest in hosting a Gateway server that links to catalog or inventory data bases in an arrangement suitable to all those involved.
- Work with partner organizations to develop appropriate metadata and other linkages (e.g., via the Internet) that describe and provide access to relevant resources.

4. Support for selected national- or regional-level node development

- Utilize existing Information Cooperative national node resources to access data and information resources of interest to SEDAC user communities.
- Generate interest in node countries in value-added services provided by SEDAC and in potential areas of contribution of data and information or of collaboration on developing value-added products.

- Where agreements do not yet exist, pursue the development of appropriate agreements that permit SEDAC access to relevant data or information resources.

3.5 User Services

This task is concerned with operating the mechanisms through which products and services flow to SEDAC's users. SEDAC has been providing user contact reports for more than two years and has acquired a significant data base reflecting its user profile. User Services' goal is to close 85% of user queries within 24 hours and 100% within 5 days.

SEDAC's User Services office will satisfy the Baseline DAAC V0 requirements as listed in NASA's Functional Requirements Document and shown below:

- provide a help desk;
- assist users in using V0 systems;
- assist users to identify and locate datasets;
- coordinate with other centers to assist users;
- track data order accuracy and completion;
- compile user service statistics;
- provide system demonstrations;
- staff user support office with science and data knowledgeable personnel;
- update information servers with the latest news;
- provide 40 hour prime-time staffing;
- be knowledgeable of processing history and product revisions;
- provide up-to-date validation information;
- develop and maintain a dictionary of DAAC-unique services; and,
- collect and compile data quality comments from users.

Additionally, User Support personnel will:

- Respond to user needs providing data, information, training, products, literature, and services;

- Prepare user contact information as part of the overall monthly report;

- Implement those user services appropriate for the level of service required by the Functional Requirements Document (FRD);

- Organize user outreach activities and workshops as appropriate; and

- Demonstrate how new products and services satisfy previously documented user requirements.

Ongoing developments in SEDAC data and information services will drive increasing need for user support in FY96. For example:

- The SEDAC/CIESIN World Wide Web server averages 1,300 users and 11,000 transactions per week, as of May 1995. This represents a 300% increase in transactions since January 1995. The WWW server provides query access to several key databases; access to MVA services; access to the CIESIN Gateway data and information catalog system; access to critical information in the form of Dataset Guides, Information Cooperative Organization Guides and Thematic Guides; and access to online software applications. The SEDAC User Services office coordinates updates to the SEDAC/CIESIN WWW server, and supports new applications as they are added.

- Data Analysis and Data Extraction software that formerly worked only on the U.S. Census Public Use Microdata Samples have been reimplemented to provide enhanced functionality applied generically to additional datasets through the Ulysses software. First generation Data Exploration Software had more than 300 registered test users, and there have been 106 requests for custom extracts, totalling more than 20.0 gigabytes of data. The value-added features of the new Ulysses software products and improved accessibility will make this a rapidly growing area of demand.

- SEDAC's unique collection of georeferenced population data appear to be of high interest to a diversity of users. Because of this diversity, user support needs are also likely to increase.

- The Archive of Census-Related Products has been accessed by more than 900 users in its first four months, and more than 10 gigabytes of data have been transferred. This will continue to be an intense area of user demand as new data products are added and as its exposure increases.

The SEDAC UWG has requested that SEDAC prepare an outreach strategy for its review at its 6-8 September 1995 meeting. It is likely that this strategy will affect the specific outreach activities to be undertaken in FY96 and beyond. At this point in time, SEDAC is aware of the following meetings, conferences, and workshops where specific outreach activities may reach important existing or new audiences *[UWG members: please suggest others!]*:

- Science Information Systems Interoperability Conference, 7-9 November 1995, University of Maryland Conference Center, College Park MD (sponsored by NASA Office of Space Sciences)
- American Geophysical Union Fall Meeting, 11-15 December 1995, San Francisco, CA (includes special session on "Monitoring of Floods and Droughts with Remote Sensing")
- Third International Conference on Integrating GIS and Environmental Modeling, 21-25 January 1996, Santa Fe NM
- American Meteorological Society/Symposium on Environmental Applications, 28 January-2 February 1996, Atlanta GA

- Third Remote Sensing Society International TERRA Conference, 2-3 April 1996, Chester College, UK
- Association of American Geographers annual meeting, 9-13 April 1996, Charlotte NC
- Computing for the Social Sciences (CSS96), 12-15 May 1996, Minneapolis MN
- International Association for Social Science Information Service and Technology (IASSIST-'96), 15-18 May 1996, Minneapolis MN
- Advanced Digital Libraries '96, May 1996, Washington DC area.
- Population Association of America, May 1996, New Orleans LA
- Sixth International Symposium on Society and Resource Management, 18-23 May 1996, State College PA
- Second Meeting of the Human Dimensions of Global Change Community, June 1996, USA

Selection of outreach activities will depend on the types of products and services that need the greatest exposure, the potential for reaching new users, budgetary and logistical factors, linkages with scientific and technical staff involvement, UWG guidance, and many other factors. On average, SEDAC expects to conduct approximately one major outreach activity per month during FY96.

3.6 Operations and Maintenance

3.6.1 System Operations

The first year of SEDAC development has involved initial service prototyping and data development. Starting in SEDAC's second contract year, significant emphasis is being placed on structured management of SEDAC's computing infrastructure and the resources required to deliver more reliable operations. A primary activity to be performed by the system operations support staff is the implementation of configuration and change control. The formal management of all changes made to the systems will be provided through a Change Control Board. This control board is composed of senior staff from software development, data development, user services, and computer operations groups. Every identified need for change is to be documented in a formal change request submitted to the Change Control Board for review and approval. Each change request must contain the following information:

1) Reason for change;
2) Type of change (e.g., correction, enhancement, deleted feature, or new feature);
3) Affected subsystems (e.g., client, interoperability, data server, data management, data processing, ingest);
4) Affected data, software, and/or hardware within subsystems;
5) Required effective date of change;
6) Implementation plan;

7) Acceptance or success criteria;
8) Impact assessment (i.e. effect on other services and related systems);
9) Fall-back or contingency plan for "undoing" the change; and
10) Required staff support (type of staff and level of effort).

Once approved, the execution of the implementation plan will be the joint responsibility of the plan leader with the Manager of Computer Services and the Manager of User Services.

During the target year, more structure will be imposed on all development activities in terms of the underlying infrastructure. Separate hardware, software, data and procedures will be maintained for development, testing, and production activities. In addition, separate support functions will be put in place to handle the life-cycle needs of hardware, software, and data.

A second important system operations activity will be the implementation and management of procedures for reliability, maintenance, and availability. This includes external support for Internet access to SEDAC services, resource backup and redundancy (e.g., alternative servers and off-line and off-site data backup), fault recovery (e.g., automated problem notification systems), vendor support programs, staff scheduling for operations (e.g., 0800 to 1700 EST for normal operations), and system security (e.g., physical access to computing equipment, firewalls and request filtering for electronic access security). Many of these activities will be initiated in the second SEDAC contract year, but it is expected that many will continue through the start of the target year.

3.6.2 Catalog Development/Metadata Production and Management

During the target year, SEDAC will continue to populate the SEDAC directory with appropriate metadata to meet the needs of the research and applied user communities. In accordance with NASA guidelines on levels of service, such metadata will include directory, inventory, guide, and browse products for key datasets. SEDAC will provide qualified metadata staff to conduct the daily operation of metadata development and management activities and to coordinate planning for future metadata services for SEDAC users. These activities include production of metadata content consistent with applicable standards and ongoing development and maintenance of a metadata management infrastructure.

The metadata production process at SEDAC involves these routine activities:

- Data resource analysis - Determination of specific metadata elements and the level of specificity required to appropriately represent the components of the data resource;

- User needs analysis - Determination of the access/search points needed by the target user group(s);

- Selection of appropriate descriptive format - Matching data and user needs to an appropriate descriptive format; or modifying format(s) to accommodate the data and user needs;

- Seeking extant descriptive information about the resource;

- Creating/recording metadata content;

- Quality checking content - coordinate internal and external (expert) review of metadata record;

- Processing and releasing metadata content; and

- Maintenance of metadata content - routinely scheduled review of GCMD metadata records and updating them as needed to ensure they are complete and accurate.

This metadata production process is integrally dependent on an effective metadata infrastructure which includes these ongoing activities:

- Data resource identification. As indicated in the SEDAC SOW and recently emphasized by the SEDAC UWG, identification of data resources of potential interest to both the natural and social science communities is vital to SEDAC's Information Gateway mission. It is important that SEDAC's scientific staff engage in a coordinated, ongoing effort to discover available data resources in the main interdisciplinary domains, to monitor developments in the scientific community relevant to data and information resource development, and to assist metadata administration staff in obtaining needed information from data and information sources. Such activities can often be combined with outreach activities or with other interactions with the research community (e.g., UWG contacts). These data identification efforts constitute an important input into the metadata production process.

- Standards development and maintenance. Along with maintaining the standards already established for SEDAC metadata (specifically for the GCMD), continued effort is required to remain knowledgeable of and involved in the wider discussions of issues concerning standards development for digital information resource description and dissemination. Several types of standards must be addressed including content (cataloging and indexing), interchange, and format standards. This requires continued review, consideration, and implementation of potential changes, and/or incorporation of new standards derived from regular SEDAC participation in system-wide DAAC efforts to identify a common set of standards and practices for metadata development.

- Technical infrastructure development. SEDAC Metadata Administration staff will continue to provide requirements and specifications for the design and update of SEDAC's metadata management system. In addition, Metadata staff will provide ongoing input for the development of appropriate SEDAC metadata access systems.

- Documentation. In order to ensure a consistent framework for the creation and management of quality SEDAC metadata, procedural manuals are needed that document the entire SEDAC metadata production process applicable to all types of metadata (directory, inventory, guide, and browse). Currently, two such manuals exist: *Metadata Guidelines* and *Indexing Vocabulary*. SEDAC will support the maintenance and periodic updating of these manuals as well as the development and maintenance of manuals documenting procedures in these key areas:

  1) *Quality Control* - identifying and outlining processes for internal and external review of metadata, periodic review for accuracy of content and indexing terms, updating and general record maintenance;

  2) *Technical Procedures* - for the entry, maintenance, and management of SEDAC metadata in compliance with system specifications and established standards addressing both format and content;

  3) *Guide Metadata Development* - identifying and outlining procedures for the creation of guide metadata that are consistent (in terms of content, accuracy and quality) with other metadata products and compliant with existing standards.

- Training/Technical Coordination SEDAC will continue to support technical training in all aspects of metadata development and management for internal and external developers of SEDAC metadata, as well as users of SEDAC metadata access systems. This is an ongoing responsibility of Metadata Administration and involves:

  1) *Internal Training* - initial training of newly appointed SEDAC Metadata Administration staff, as well as ongoing training to maintain staff expertise throughout SEDAC on current procedures and standards;

  2) *External Training* - training for Information Cooperative Partners producing metadata (in the form of directory records and guides) describing their own data resources in compliance with the GCMD;

  3) *Technical Assistance* - ongoing technical assistance with SEDAC system specifications and standards compliance, as well as metadata content review for Information Cooperative Partners.

- Metadata Content Coordination. Coordination of metadata activities throughout SEDAC will be conducted to ensure that: SEDAC metadata and data products are appropriately integrated; SEDAC metadata management and access systems are functioning and evolving in tandem; SEDAC development and management resources are appropriately shared/maximized among projects; SEDAC metadata activities and products are evaluated for appropriateness and effectiveness in meeting user needs; SEDAC is current and forward-thinking in the arena of metadata; and the SEDAC catalog is populated with metadata that addresses the science priorities specified in the SDP and PADP.

3.6.3 Data Archive Maintenance

During the target year, SEDAC will conduct maintenance activities including backup/preservation, integrity checking, routine maintenance and file management, and rotation of data between on-line, near-line, and off-line storage, as warranted by actual use. It will also update metadata as needed. SEDAC will pursue a vigorous program of integrity checking data that are being made available for dissemination. Preservation will be assured through backups of major datasets to CD-ROMs. One backup copy is stored on site and one at an off-site location. Periodic reviews will take place with regard to appropriate dissemination formats and dissemination media. SEDAC will evaluate all data for which it is the primary archive and will conduct any work required to assure compliance with applicable National Archives and Records Administration (NARA) and National Institute for Standards and Technology (NIST) standards. SEDAC will participate in a DAAC system-wide effort to identify a common set of standards and practices for data maintenance and preservation.

3.7 V0-V1/V2 Transition Activities

This category of effort includes activities involved in the transition from EOSDIS V0 to ECS V1. This transition will be of an evolutionary nature, since it has been determined that the initial release of V1 (Release A) will utilize the V0 client (Release 6) and that V1 will support compatible operation with V0 protocols and message formats. Thus, improvements to the SEDAC-V0 gateway will be directly applicable to V1.

SEDAC will continue to improve the V0 gateway and to ensure interoperability with Release 6 of the system. As this release is adapted by Hughes for inclusion in V1, SEDAC will take steps to ensure that interoperability with ECS is maintained after the transition.

Following Release A, SEDAC will work with Hughes towards creating a SEDAC-V1 gateway which is independent of the SEDAC-V0 gateway. This gateway will utilize ECS protocols and software toolkits as necessary to establish true interoperability with ECS components destined for operational capability in Release B. Transition from ECS V1 to ECS V2 does not apply to SEDAC as a local activity.

3.8 External Interfaces

External interfaces are required for SEDAC interaction with EOSDIS, inter-agency systems, and external data providers. The following subsections describe activities in each of these categories.

3.8.1 EOSDIS

This includes interfaces to EOSDIS elements as necessary to provide bi-directional interoperability between the two systems. This activity addresses both V0 and V1 interoperability.

External interfaces to EOSDIS include the elements necessary for SEDAC-to-V0 as well as V0-to-SEDAC communication. SEDAC-to-V0 interfaces consist primarily of software components which serve as a "bridge" between the two systems. These components provide an interface to the SEDAC IMS ("Gateway") system to perform transparent access to EOSDIS systems.

The SEDAC-V0 bridge communicates with the Gateway system using established SEDAC protocols and messages. V0 appears to the SEDAC user just as any other node on the distributed SEDAC network. The SEDAC-V0 bridge translates Gateway requests into messages and protocol objects understood by V0 servers running at the other DAACs. To the V0 system, the SEDAC-V0 bridge appears just like an IMS client. V0 messages returned from the DAACs are translated into SEDAC messages and returned to the SEDAC client.

The V0-SEDAC bridge operates in a similar manner. It communicates with V0 clients using established V0 protocols and messages, appearing just like any other DAAC V0 server. The V0-SEDAC bridge translates V0 requests into SEDAC messages and protocols understood by the SEDAC server (known as the "User Agent"). SEDAC messages returned from the Gateway system are translated into V0 messages and returned to the V0 client.

The components necessary to support the above interoperability scenario are in the prototype phase as of SEDAC's initial operational mode. Development of these prototypes will continue in 1995 and 1996, leading to operational status. Responsibility for the SEDAC-V0 bridge lies primarily with the SEDAC development team, whereas responsibility for the V0-SEDAC bridge lies with NASA and Hughes developers. SEDAC, NASA, and Hughes will continue to cooperate closely on the development of the EOSDIS external interfaces, including regularly scheduled meetings and teleconferences, as well as programming assistance.

This category also includes work necessary to establish external interfaces to ECS V1. The initial release of ECS (Release A) will be compatible with V0 protocols and messages; therefore the SEDAC-V0 bridge can be utilized for this release. Subsequent releases of ECS will require additional SEDAC interfaces, which will be based on ECS components. SEDAC will examine ECS software components as they become available

to determine how they might be integrated with SEDAC systems to establish SEDAC-V1 interoperability.

3.8.2 Inter-Agency Activities

SEDAC must establish interfaces to other agencies as indicated by EOSDIS and SEDAC requirements. A primary example of this type of external interface is the Global Change Data and Information System (GCDIS).

SEDAC has actively participated in the development of GCDIS and will continue to do so by attending key meetings, reviewing documentation, and so forth. As GCDIS prototypes become available, SEDAC will seek to establish interoperability with these systems.

SEDAC will also closely monitor other Inter-Agency activities and participate where appropriate. One example of such an activity is the deployment of the Government Information Locator Service (GILS), in which all government agencies must participate. SEDAC will take steps to ensure GILS compliance by developing external interfaces which perform the necessary communication and translation (e.g., using the Z39.50 protocol to deliver GILS compliant records).

3.8.3 Other Information Providers

SEDAC's distributed archive relies heavily upon data and information provided by third party organizations. Establishing access to remotely-located information sources involves the implementation of external interfaces to these sites.

SEDAC will establish connectivity to remote sites as necessary to support its distributed archive. This activity will consist primarily of customizing and deploying network servers which provide a gateway between the SEDAC IMS and the remote database.

4.0 Out-Year Projections

4.1 Development

This section describes the out-year projections for activities related to the development of SEDAC systems and subsystems.

4.1.1 DAAC-Unique V0 System Development

This category includes the continued development of a local data and information system to meet the V0 functional requirements. The development of core SEDAC systems will be largely completed in 1996, with subsequent development efforts focused on incremental enhancements. SEDAC will continue to analyze requirements derived from SEDAC users and EOSDIS and implement extensions to the SEDAC operational system as necessary.

4.1.2 Version 0 System Level Tasks

This category includes SEDAC's participation in EOSDIS V0 system-level activities. SEDAC will continue to actively participate in V0 development activities including technical meetings and teleconferences. It is expected that V0 activities will be phased out in 1996 as the transition from V0-V1 is completed.

4.1.3 Version 0 Sustaining Engineering

This category includes enhancements or modifications to the SEDAC system that are within the requirements to V0 and the functionality of the operational system. Experience with the operational system will dictate enhancements or modifications that are necessary to maintain the smooth operation of SEDAC.

4.1.4 ECS Prototyping

As previously mentioned prototyping work in support of local ECS components does not apply to SEDAC. However, SEDAC will be developing a number of its own prototypes in support of its local system capabilities (as defined in the SEDAC Prototyping Plan). One of these prototyping activities is intended to specifically address added levels of interoperability (e.g., inventory searching) between the SEDAC Gateway services and V0 IMS. These efforts are also intended to be in support of similar interoperability functions for ECS V1 and V2.

4.2 ECS Interface

SEDAC will continue to participate in ECS development activities, including Focus Team meetings, technical reviews, system-level activities, etc. SEDAC will work with ECS staff to provide support on the implementation of SEDAC interoperability. This will involve the evolution of the SEDAC-EOSDIS bridge software to incorporate new ECS components as they become available.

4.3 Dataset Acquisition and Ingest

AA will continue to acquire and archive datasets that are required for supporting applications development and Information Gateway tasks. This includes data acquisition, conditioning, preparation of documentation, ingestion, and maintenance of archives.

Though AA will continue to acquire datasets required for all applications development initiatives in general, it is expected that more focus will be given to new applications development initiatives identified through collaboration with other DAACs. AA will pay increased attention on the data management process such as recording the information that is required to track the acquisitions and archiving.

Updating datasets will also be of prime importance during the out-years. This will be performed according to initial plans, applicable guidance from the SEDAC UWG, and review based on use and user feedback. In the out-years, there are possibilities for transferring some datasets from SEDAC's local archive to other locations in order to take advantage of resource sharing, economies of scale, or other factors. As SEDAC's Gateway system becomes more robust, it is anticipated that the number of Gateway server sites will increase considerably. This will require AA to work closely with CIESIN's Information Cooperative program by making contacts, negotiating data access agreements, and maintaining good relations with each site partner.

4.4 Mission Support

4.4.1 Population, land use, and emissions

Depending on progress during the target year, user feedback, and UWG guidance, it is expected that development activities under this task will phase out and be replaced by a new applications development task to be determined through required SEDAC procedures.

4.4.2 Visualization and analysis of integrated assessment models of climate change

Depending on progress during the target year, user feedback, and UWG guidance, it is expected that development activities under this task will decrease to a modest level of effort aimed primarily at ingesting new models and model scenarios into the existing system.

4.4.3 *Other possible application development activities*

SEDAC will continue to explore new applications development opportunities, focusing especially on new data and information products available from EOS missions as they become available from other DAACs. These exploratory activities will be conducted with guidance from the UWG and in cooperation with the other DAACs and selected collaborators.

4.4.4 *Information Gateway Development*

SEDAC will continue to work closely with CIESIN's Information Cooperative program to identify and access datasets required as part of SEDAC applications development activities. SEDAC will continue to keep track of relevant data being produced by socioeconomic research and data communities and to support access to catalogs of national and sub-national level socioeconomic data developed by national and international organizations. These catalogs will be interoperable with the GCMD through the Information Gateway.

4.5 User Services

SEDAC's User Services office will maintain an ongoing goal of closing 85% of user requests within 24 hours, and 100% within five days. Levels of service provided will match those of NASA's Functional Requirements Document or other specified requirements. SEDAC outreach will continue to average one event per month. Maintenance of the SEDAC World Wide Web site will be an increasingly important task, along with support of the CIESIN Kiosk.

4.6 Operations and Maintenance

4.6.1 *System Operations*

During each of the out years in the current SEDAC system development plan, new prototype activities will be integrated into an operational environment. SEDAC Operations and Maintenance staff will be centrally involved in the installation and test phases of prototype integration. In addition, as usage and performance statistics accumulate for existing system components, operations staff will be working with system developers to address performance issues and concerns related to reliability.

4.6.2 *Catalog Development/Metadata Production and Management*

Metadata staff will continue to populate the SEDAC directory with appropriate metadata to meet the requirements of the applications development and Information Gateway tasks. Metadata Administration will focus primarily on developing appropriate directory, inventory, and/or guide metadata for ongoing applications tasks, prototype applications, and interdisciplinary data areas specified by the UWG.

SEDAC metadata staff will continue to perform the routine activities associated with the oversight and maintenance of metadata production for directory, inventory, and guide products. These activities will include:

- research, production, review, quality control, and updating of metadata records; and
- development and maintenance of metadata production content standards and guidelines, such as indexing vocabularies, and format and content specifications for data set guides.

In addition to the routine activities associated with SEDAC metadata production, SEDAC metadata staff will continue to:

- document procedures for metadata creation;
- provide requirements and specifications for the design and update of SEDAC's metadata management and access systems;
- support technical training in metadata development and management for internal and external developers of SEDAC metadata; and
- coordinate the integration of metadata development throughout SEDAC initiatives.

4.7 V0-V1 Transition Activities

This category includes activities involved in the transition from EOSDIS V0 to ECS V1. While the initial release of V1 will utilize V0 components, subsequent releases will be based on new components developed for ECS. Thus, the SEDAC-V0 gateway will be phased out starting with Release B of ECS, to be replaced with a new gateway based on ECS-provided software components.

4.8 External Interfaces

External interfaces are required for SEDAC interaction with EOSDIS, inter-agency systems, and external data providers. The following subsections describe out-year activities in each of these categories.

4.8.1 EOSDIS

This includes interfaces to EOSDIS elements as necessary to provide bi-directional interoperability between the two systems. In the out-years, this activity consists of V1 interoperability. The SEDAC-to-V0 and V0-to-SEDAC gateways will be evolved as necessary to support ECS V1 interoperability. The new gateway will utilize ECS-developed components.

4.8.2 *Inter-Agency Activities*

SEDAC will continue to establish interfaces to other agencies as indicated by EOSDIS and SEDAC requirements.

4.8.3 *Other Information Providers*

As SEDAC makes new information available through the system, connectivity to new remote information providers may be necessary. SEDAC will establish connectivity to remote sites as necessary to support its distributed archive.

5.0 Milestone Charts

5.1 Long Term Overview Milestone Chart

The key milestones for the SEDAC are illustrated in Figure 5.1. Of importance are some changes to names in the milestone chart that are unique to SEDAC. The lines in other DAAC milestone charts titled "Launches" and "Field Campaigns" do not apply to SEDAC because there are no local satellite mission activities related to data collection. V0 Data Migration also does not apply because SEDAC is not physically migrating their data into local ECS data servers. Also, because ECS science software is being developed specifically against non-SEDAC data requirements, it is unlikely that SEDAC will be performing Science Software Integration and Test work similar to the other DAACs. Finally, because there are no scheduled ECS on-site activities for SEDAC, ECS release schedules only impact SEDAC in the sense that SEDAC will be aware of when ECS software is available for evaluation or review. There is no need to hire staff and train them specifically to operate ECS software. SEDAC's data and application services will be managed by its own local software and hardware systems.

Therefore, the lines in the SEDAC milestone chart have been re-defined to reflect local SEDAC system development activities that will interface externally with EOSDIS and ECS.

SEDAC Release X - Development, installation, and integration and test of SEDAC subsystem components. Releases A, B, C, and D have been planned. ***These are SEDAC releases that do not correspond directly to ECS release A, B, C, and D.***

SEDAC Operations for Release X - These lines are related to operations and maintenance activities for each of the four SEDAC system releases.

5.2 Detailed Target Year Schedule

Detailed schedules for target year activities include dates for data development, prototyping activities, and different levels of system testing (Tables 5.1-1 to 5.1-4).

Figure 5.1-1 - Key EOSDIS Milestones Related to the SEDAC

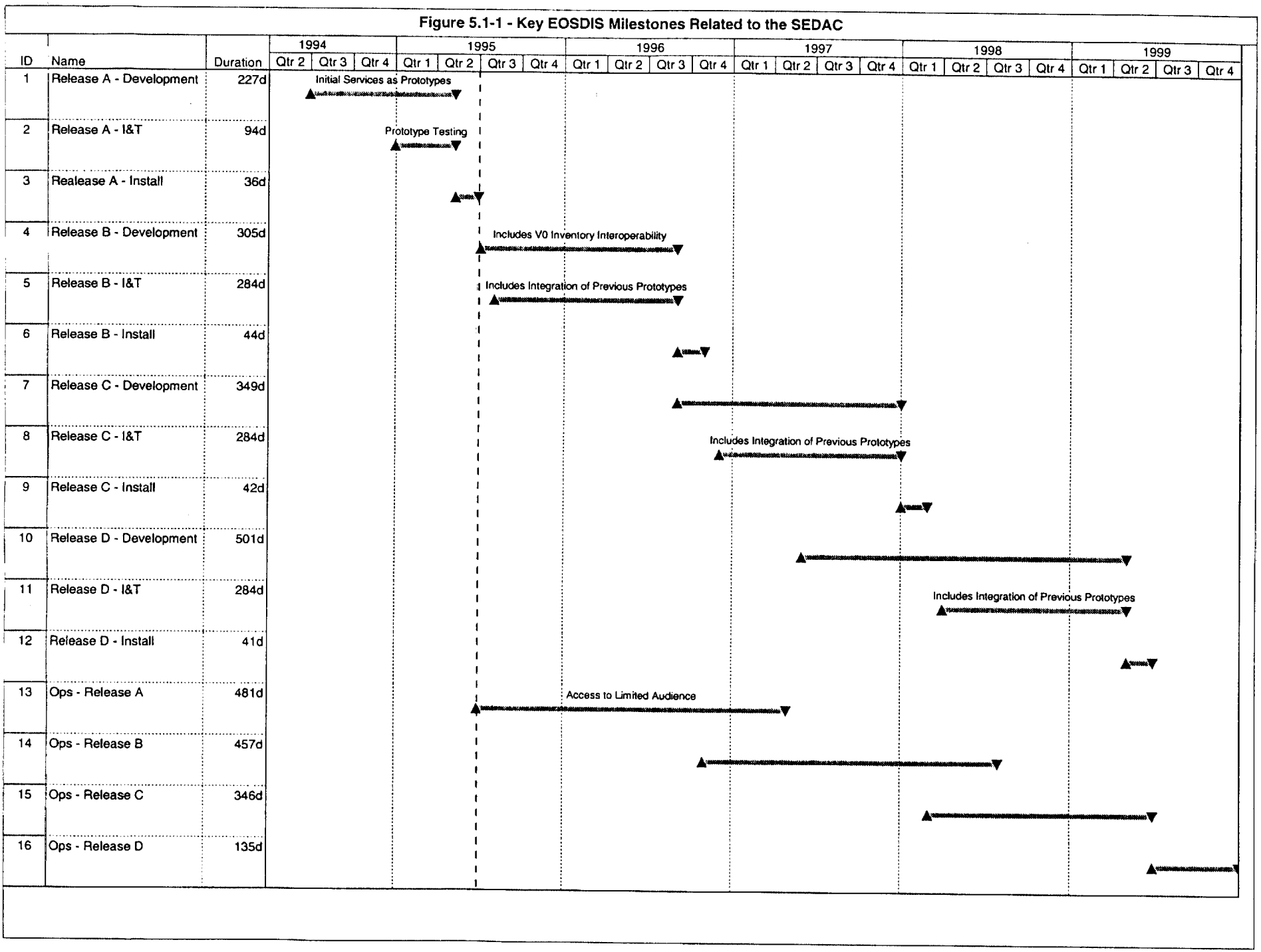

Table 5.1-1 - Release A (7/1/94 - 4/30/97)

Prototyping	7/1/94 - 5/10/95
Define Test Plan	10/3/94 - 11/30/94
Develop Test Data	11/15/94 - 2/13/95
Alpha Test	12/30/94 - 3/15/95
Beta Test	3/1/95 - 5/10/95
Develop Operational Data	10/1/94 - 5/10/95
Install for Full Operations	5/10/95 - 6/28/95
Begin Full Operations	6/28/95
Operations and Maintenance	6/28/95 - 4/30/97

Table 5.1-2 - Release B (7/1/95 - 7/30/98)

New Prototyping	7/3/95 - 5/31/96
Previous Prototype Integration	7/1/95 - 11/30/95
Define Test Plan	7/3/95 - 8/31/95
Develop Test Data	8/1/95 - 11/30/95
Alpha Test	12/1/95 - 3/31/96
Beta Test	4/1/96 - 8/31/96
Develop Operational Data	12/1/95 - 9/2/96
Install for Full Operations	9/2/96 - 10/31/96
Begin Full Operations	10/30/96
Operations and Maintenance	10/30/96 - 7/30/98

Table 5.1-3 - Release C (5/31/96 - 6/28/99)

New Prototyping	9/1/96 - 5/30/97
Previous Prototype Integration	5/31/96 - 2/7/97
Define Test Plan	11/1/96 - 12/31/96
Develop Test Data	12/2/96 - 3/30/97
Alpha Test	3/3/97 - 6/30/97
Beta Test	7/1/97 - 12/31/97
Develop Operational Data	4/15/97 - 1/1/98
Install for Full Operations	1/1/98 - 2/28/98
Begin Full Operations	3/2/98
Operations and Maintenance	3/2/98 - 6/28/99

Table 5.1-4 - Release D (6/1/97 - 6/28/99)

New Prototyping	6/1/97 - 6/29/98
Previous Prototype Integration	6/1/97 - 6/29/98
Define Test Plan	3/2/98 - 4/30/98
Develop Test Data	4/1/98 - 7/30/98
Alpha Test	7/1/98 - 10/30/98
Beta Test	11/2/98 - 4/30/99
Develop Operational Data	8/7/98 - 5/3/99
Install for Full Operations	5/3/99 - 6/28/99
Begin Full Operations	6/28/99
Operations and Maintenance	6/28/99 - (?) 12/31/99

6.0 Operating and Data Set Budgets

This section presents the overall SEDAC budget in two forms:

1) a detailed operating budget following the format described in the SMP; and

2) an approximate budget breakdown by data set.

It is of course important to note that SEDAC differs from the other DAACs in that its primary focus is not a small number of major satellite or field-campaign datasets. SEDAC's budget and task structure do not map precisely into the categories specified. The actual mapping of labor resources is presented in Section 7 (Staffing Projection); other direct costs are mapped in a corresponding manner.

6.1 Operating Budget

SEDAC's planned operating budget through FY00 is presented in Table 6.1-1. The initial contract year was 28 June 1994 - 27 June 1995, so the figures in Table 6.1-1 do not correspond exactly to the 1 November - 31 October time period.[6] However, since SEDAC total funding is expected to be level for 28 June 1995 - 27 June 1999, variations in estimates due to this shift should be minor. For FY99 and FY00, it has been assumed that the SEDAC contract will be renewed at the same total level of funding.

Budget estimates in Table 6.1-1 include pro-rated estimates of all indirect costs, including government-approved overhead and benefit rates and fees.

6.2 Data Set Budget

The following table lists the cost of acquisition (i.e., the cost of purchasing the data from a provider other than CIESIN) for each data set or data collection. In addition to acquisition costs, there is a nominal cost for correspondence between SEDAC and each data provider. For each data set, 2-to-3 copies are routinely made for backup and recovery purposes. Distribution costs will obviously depend upon the number of copies ordered and whether or not only a portion of the entire data set is delivered. The preferred media for internal use is CD and 8mm tape. Current prices for CDs and 8mm tapes are approximately $12.50 and $8.95 each, respectively. The current capacity for a CD is approximately 680 MB whereas the capacity for 8mm tapes can range from 2 to 25 GB depending upon the hardware and software used. Typical 8mm capacities are 5-6 GB per tape.

[6] During the first year, SEDAC also coordinated its activities with activities supported by CIESIN's grant from NASA.

Table 6.1-1 SEDAC DAAC Planned Staffing - UPN 752

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Staffing (FTEs)	FY95	FY96	FY97	FY98	FY99	FY00
Management	6.06	5.17	4.99	4.78	4.78	4.78
Development						
V0 DAAC Internal IMS, DADS, PGS	7.63	6.94	6.19	5.59	4.99	4.99
V0 System Level Tasks	3.13	2.35	2.14	0.40	0.00	0.00
V0 Sustaining Engng/Maintenance	0.00	0.10	0.10	0.05	0.00	0.00
ECS Prototyping	0.00	0.00	0.00	0.00	0.00	0.00
DAAC Unique ECS Extensions	0.00	0.00	0.00	1.54	1.79	1.79
ECS Interface						
V0, etc Liason	0.00	0.00	0.00	0.00	0.00	0.00
On-Site ECS Contractor Direction	0.00	0.00	0.00	0.00	0.00	0.00
Dataset Acquisition and Ingest	6.15	6.17	6.17	5.42	5.42	5.42
Mission Support						
Non-EOS Missions	9.69	10.40	10.03	9.24	8.58	8.58
EOS Missions	0.00	0.00	0.00	0.00	0.00	0.00
EOS Science Software Support	0.00	0.00	0.00	0.00	0.00	0.00
Field Campaign Support	0.00	0.00	0.00	0.00	0.00	0.00
User Services	3.18	3.58	3.58	4.61	4.61	4.61
Operations						
V0 System	0.20	0.30	0.35	0.00	0.00	0.00
ECS	0.00	0.10	0.20	0.20	0.20	0.20
DAAC Unique	5.84	6.39	6.74	7.09	7.09	7.09
ECS Transition Activities	0.00	0.00	0.00	0.00	0.00	0.00
External Interfaces						
System (EDOS/ECOM, IV&V)	0.00	0.00	0.00	0.00	0.00	0.00
Interagency (GCDIS, etc)	0.00	0.00	0.00	0.00	0.00	0.00
International (WDC, CEOS, etc)	0.00	0.00	0.00	0.00	0.00	0.00
Total Staff (FTEs)	41.88	41.49	40.48	38.92	37.46	37.46

SEDAC Staffing Rollup

950525

Activity by Year:	FY95	FY96	FY97	FY98	FY99	FY00
Management	6.1	5.2	5.0	4.8	4.8	4.8
Development	10.8	9.4	8.4	7.6	6.8	6.8
ECS Interface	0.0	0.0	0.0	0.0	0.0	0.0
Dataset Acquisition and Ingest	6.2	6.2	6.2	5.4	5.4	5.4
Mission Support	9.7	10.4	10.0	9.2	8.6	8.6
User Services	3.2	3.6	3.6	4.6	4.6	4.6
Operations	6.0	6.8	7.3	7.3	7.3	7.3
ECS Transition Activities	0.0	0.0	0.0	0.0	0.0	0.0
External Interfaces	0.0	0.0	0.0	0.0	0.0	0.0
Staff Total	41.9	41.5	40.5	38.9	37.5	37.5

FTE Rate by Category by Year

950525

Activity by Year:	FY95	FY96	FY97	FY98	FY99	FY00
Management	141.3	155.3	161.8	168.9	174.9	181.9
Development	110.0	113.4	112.9	118.6	124.1	129.1
ECS Interface	0.0	0.0	0.0	0.0	0.0	0.0
Dataset Acquisition and Ingest	99.2	106.3	109.9	113.4	117.5	122.2
Mission Support	134.9	133.1	131.8	137.0	139.9	145.5
User Services	103.8	105.7	109.5	111.0	115.5	118.9
Operations	87.7	88.5	97.2	100.6	104.2	108.4
ECS Transition Activities	0.0	0.0	0.0	0.0	0.0	0.0
External Interfaces	0.0	0.0	0.0	0.0	0.0	0.0

Table 6.2-1. Data Set Acquisition Costs

Dataset	Source	Est. size (MB)	Acquisition Cost $
Task 2.2			
STF 1B (full version) includes all states	U.S. Census Bureau	74,990	48,750
STF 4A (All States)	U.S. Census Bureau	84,208	85,000
STF 4B (All States)	U.S. Census Bureau	34,247	40,000
STF 4C (All Files)	U.S. Census Bureau	36,600	43,325
Canadian Census 1970, 1980, 1990	Stat.Canada		TBD
Canada Subnational Boundaries			
Global Boundary Datasets	NCGIA		Free
Land Characterization Dataset- Mexico	EDC		TBD
Integrated Dataset for Mexico	SEDAC		
Integrated Dataset for Canada	SEDAC		
Task 2.3			
IMAGE 2.1	RIVM		Free
DICE model	Dale Jorgenson		Free
MiniCAM	Battelle/ PNL		Free
ICAM	CMU		Free
Documents for Integrated Assessment Models			2,000
Task 2.1			
Stratospheric Ozone Depletion and Health			
Stratospheric Aerosol Measurement II (SAM II) CD-ROM	LaRC		Free
U.S. Air Force Global Weather Central's Real-Time Nephaanalysis Model (RTNEPTH)	NCDC		Free
Policy Instuments Data Base			
UNCED NGO documents CD-ROM	UNCED	100	100
Green Globe Yearbook		100	100
International Treaties Database	IUCN	5	3000
Nat ional and International Water Legislation	FAO		

Table 6.2-1. Data Set Acquisition Costs (continued)

Dataset	Source	Est. size (MB)	Acquisition Cost $
International Legal Materials			150
American Journal of International Law			100
International Environmental Law Reporter			1800
China Population and Land Use Data Base			
China 1990 Census Data	CPIRC		TBD
Chinese Economic Yearbook			
Land Use Map of China-1985	Institute of Geography, China		TBD
Elevation/ Topography of China			
Chinese Micro-economic data	CEMC		7000
Domain Datasets			1000
Supporting Datasets			500

7.0 Staffing Projection

SEDAC staffing in FY95 and projected staffing in FY96 and beyond are summarized in Table 7.1-1. These estimates are based on the five-year staffing profile included in the SEDAC contract. The initial contract year was 28 June 1994 - 27 June 1995, so the figures in Table 7.1-1 do not correspond exactly to the 1 November - 31 October time period. However, since SEDAC total funding is expected to be level for 28 June 1995 - 27 June 1999, variations in estimates due to this shift should be minor. For FY99 and FY00, it has been assumed that the SEDAC contract will be renewed at the same total level of funding and that staffing levels will decrease by approximately 4% per year to allow for labor cost increases.

7.1 Correspondence between DAAC Activity Categories and SEDAC Work Breakdown Structure

The SEDAC contract defines a Work Breakdown Structure (WBS) which has been mapped to the categories in Table 7.1-1. *Management* includes SEDAC WBS Task 1 including all activities of the SEDAC Manager, Systems Engineer, Administrative Analyst, and Secretary plus half-time allocations for the SEDAC Project Scientist and a Contracts Administrator. *Development* includes all of SEDAC WBS Task 4, Systems Development. The staffing estimates include contract labor provided by Polytechnic University under subcontract to SEDAC. Most but not all of these activities fall under the category of DAAC Unique ECS Extensions.

Because SEDAC will not receive direct ECS contractor support for its utilization of V0 (see SMP Appendix B), no specific staff allocation has been made to *ECS Interface* activities. However, as needed, selected SEDAC staff including the SEDAC Systems Engineer and SEDAC Manager of Computer Services will participate in various Focus Team and liaison activities as part of their regular duties in order to monitor progress in V0 and other ECS development.

Dataset Acquisition and Ingest includes two SEDAC WBS subtasks, 5.2 (Catalog Population) and 5.4 (Data Archive). As in other DAACs, these subtasks encompass acquisition of new datasets by SEDAC, including reformatting and development of documentation and metadata and incorporation of the datasets into the DAAC holdings for archive and distribution. It also includes SEDAC's extensive efforts to document the holdings of other social science data resources.

Since SEDAC is not supporting any EOS Missions, no staff are allocated to *EOS Missions, EOS Science Software Support,* or *Field Campaigns.* However, both the applications development effort and the Information Gateway activities essentially constitute *"Non-EOS Missions"* that include negotiation of inter-organizational agreements and data management plans with various Information Cooperative

Table 7.1-1 SEDAC DAAC Planned NOA - UPN 752

950525

Activity Budget ($K)	FY95	FY96	FY97	FY98	FY99	FY00	Total
Management	856	803	808	807	836	869	4,979
Development	1,182	1,064	952	899	842	875	5,815
ECS Interface Staff	0	0	0	0	0	0	0
Dataset Acquisition and Ingest	611	655	678	614	637	662	3,857
Mission Support	1,308	1,384	1,322	1,266	1,200	1,248	7,729
User Services	331	378	392	512	533	548	2,693
Operations	530	601	708	733	760	790	4,122
ECS Transition Activities	0	0	0	0	0	0	0
External Interfaces	0	0	0	0	0	0	0
Staff Subtotal	4,817	4,886	4,859	4,832	4,807	4,993	29,194
Travel	98	106	110	115	119	124	672
ECS Interface Travel	0	0	0	0	0	0	0
Training	0	0	0	0	0	0	0
User Working Group Support	52	57	59	61	64	66	359
Equipment (HW & SW)	218	280	282	275	262	272	1,588
Maintenance (HW & SW)	94	116	129	149	169	176	833
Materials	248	96	96	97	103	108	748
Facility	0	0	0	0	0	0	0
Miscellaneous	123	130	135	141	146	152	827
Core Total	5,650	5,670	5,670	5,670	5,670	5,891	34,222
Plus Over Guide	0	0	0	0	0	0	0
Minus Previous Year Carryover	0	0	0	0	0	0	0
New FY Funding Required	5,650	5,670	5,670	5,670	5,670	5,891	34,222

SEDAC DAAC Planned NOA - Functional - UPN 752

950525

Functional/Data Budget ($K)	FY95	FY96	FY97	FY98	FY99	FY00		Total
Management	953	909	918	922	955	994		5,651
Institutional Operations	1,047	1,000	1,128	1,181	1,242	1,292		6,889
System Development	1,401	1,344	1,233	1,174	1,103	1,147		7,403
ECS Interface	0	0	0	0	0	0		0
Mission/Data Set Costs	2,249	2,418	2,391	2,393	2,370	2,459		14,278
Total	5,650	5,670	5,670	5,670	5,670	5,891		34,222
Mission/Data Set Breakdown/Totals	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0

Management:	Institutional Operations:	System Development:	ECS Interface:
Management	Operations	Development	ECS Interface Staff
External Interfaces	User Working Group Support	ECS Transition Activities	ECS Interface Travel
Travel	Maintenance (HW & SW)	Equipment (HW & SW)	
Training	Materials	Facility	
	Miscellaneous		

Mission/Data Set Costs
Dataset Acquisition and Ingest
Mission Support
User Services

partners; provide guidance and inputs on data formats, media, metadata, and documentation; planning for transfer of data and metadata from distributed data systems and archives to the DAAC; and support to sources and holders of relevant data and information. Staff allocations for SEDAC WBS tasks 2 and 3 are therefore included in this category.

User Services in Table 7.1-1 directly corresponds to SEDAC WBS task 6. *Operations and Maintenance* encompasses SEDAC WBS subtasks 5.1, 5.3, 5.5, and 5.6: Operations Management, Catalog Operations, Distribution, and Product Development, respectively. As in the case of the ECS Interface category, no specific staff allocations have been made to *ECS Transition Activities*, since data and metadata migration between V0 and Versions 1 and 2 are not applicable. However, SEDAC staff will monitor these transition activities closely and take actions as needed to ensure continued interoperability between SEDAC and other EOSDIS systems.

External Interfaces also have limited applicability to the present SEDAC WBS. At this point in time, no requirement for additional links to other EOSDIS elements is anticipated. Like the other DAACs, SEDAC is considered a part of the Global Change Data and Information System (GCDIS) and could become involved in modest experiments to establish interoperability between SEDAC and EOSDIS data systems and those of other agencies participating in GCDIS. However, no specific activities have been defined thus far. Similarly, CIESIN has had some level of contact with the Committee on Earth Observing Satellites (CEOS), particularly its Auxiliary Data working group, and has applied to become a World Data Center. Until such time as a more well-defined role has been established, no specific staff allocation has been made to this category.

7.2 Projected Staffing Trends

The staffing trends indicated in Table 7.1-1 reflect those trends negotiated with the COTR as part of SEDAC's current five-year contract. Because the total value of the SEDAC contract is expected to remain constant over the life of the contract and because of allowable labor escalation rates of 3.4 to 3.5% for 1994-98, SEDAC's overall staffing level must decrease somewhat assuming that other direct costs stay roughly constant. COTR guidance has indicated that SEDAC management, applications development and science planning (Non-EOS Mission Support) should remain reasonably stable over the five-year contract. Operations and Maintenance and User Services should increase during the period as more products and services become available and the user base increases. The major decreases come primarily in Development, reflecting a shift from systems development during the first two years to sustaining engineering including system enhancements during the latter part of the contract.

References

1. National Aeronautics and Space Administration/Goddard Space Flight Center, Earth Science Data and Information System Project, *Earth Observing System Data and Information System (EOSDIS) Distributed Active Archive Center (DAAC) Strategic/Management Plan*, March 22, 1995.

2. Hunolt, Gregory and Mary Reph, *Letter Request for FY96 Work Plan Guidance*, National Aeronautics and Space Administration/Goddard Space Flight Center, May 2, 1995.

Acronyms and Abbreviations

AA	Archives and Acquisitions
ADEOS	Advanced Earth Observing Satellite
ASF	Alaska SAR Facility
AVHRR	Advanced Very High Resolution Radiometer
CD-ROM	Compact Disk Read-Only Memory
CEOS	Committee on Earth Observing Satellites
CIESIN	Consortium for International Earth Science Information Network
CITAS	China in Time and Space
DAAC	Distributed Active Archive Center
DCW	Digital Chart of the World
DICE	Dynamic Integrated Model of Climate Change and Its Effects on the Economy
DIF	Directory Interchange Format
ECS	EOSDIS Core System
EDC	EROS Data Center
EOS	Earth Observing System
EOSDIS	EOS Data and Information System
FRD	Functional Requirements Document
FY	Fiscal Year
GB	gigabytes
GCMD	Global Change Master Directory
GCRP	Global Change Research Program
GILS	Government Information Locator Service
GIS	Geographic Information System
GSFC	Goddard Space Flight Center
HDF	Hierarchical Data Format
HDP	Human Dimensions of Global Environmental Change Programme
HTML	HyperText Markup Language
IAM	Integrated Assessment Model
IEC	International Environment Commitments
IGP	Information Gateway Plan
IIASA	International Institute for Applied Systems Analysis
IMAGE	Integrated Model to Assess the Greenhouse Effect
IMS	Information Management System
ISCCP	International Satellite Cloud Climatology Program
IUCN	International Union for the Conservation of Nature

JPL	Jet Propulsion Laboratory
LaRC	Langley Research Center
MoU	Memoranda of Understanding
MSFC	Marshall Space Flight Center
MTPE	Mission to Planet Earth
MVA	Model Visualization Analysis
NARA	National Archives and Records Administration
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NGO	Non-governmental Organization
NIST	National Institute for Standards and Technology
NOA	page viii
NRC	National Research Council
NSIDC	National Snow and Ice Data Center
ORNL	Oak Ridge National Laboratory
PADP	Policy Applications Development Plan
PIDB	Policy Instrument Database
PRC	People's Republic of China
RIVM	National Institute on Public Health and Environmental Protection
SDP	Science Data Plan
SDTS	Spatial Data Transfer Standard
SEAWifs	Sea-viewing Wide Field-of-view Sensor
SEDAC	Socioeconomic Data and Applications Center
SMP	Strategic Management Plan
SOW	Statement of Work
STF	Summary Tape File
TERRA	Terrestrial Ecosystem Regional Research and Analysis Laboratory
TOMS	Total Ozone Mapping Spectrometer
UNCED	United Nations Conference on Environment and Development
UNEP/GRID	United Nations Environment Programme/Global Resource Information Database
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPN	pg viii
UV-B	UltraViolet-B radiation
UWG	User Working Group
V0	Version 0
WBS	Work Breakdown Structure
WCMC	World Conservation Monitoring Centre
WWW	World Wide Web

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Robert S. Chen
Principal Investigator - compiler

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Consortium for International Earth Science Information Network
2250 Pierce Rd.
University Center, MI 48710

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